

with an internal excess flow valve. In addition to the internal excess flow valve, the inlet and discharge outlets must be equipped with an external stop valve (angle valve). Excess flow valves must conform to the standards of The Chlorine Institute, Inc., as follows:

(1) A valve conforming to Drawing 101-7, dated July 1993, must be installed under each liquid angle valve.

(2) A valve conforming to Drawing 106-6, dated July 1993, must be installed under each gas angle valve.

(c) *Discharge outlets on carbon dioxide, refrigerated liquid, cargo tanks.* A discharge outlet on a cargo tank used to transport carbon dioxide, refrigerated liquid is not required to be fitted with an internal self-closing stop valve.

[64 FR 28049, May 24, 1999, as amended at 66 FR 45387, Aug. 28, 2001]

§ 178.337-9 Pressure relief devices, piping, valves, hoses, and fittings.

(a) *Pressure relief devices.* (1) See § 173.315(i) of this subchapter.

(2) On cargo tanks for carbon dioxide or nitrous oxide see § 173.315 (i) (9) and (10) of this subchapter.

(3) Each valve must be designed, constructed, and marked for a rated pressure not less than the cargo tank design pressure at the temperature expected to be encountered.

(b) *Piping, valves, hose, and fittings.* (1) The burst pressure of all piping, pipe fittings, hose and other pressure parts, except for pump seals and pressure relief devices, must be at least 4 times the design pressure of the cargo tank. Additionally, the burst pressure may not be less than 4 times any higher pressure to which each pipe, pipe fitting, hose or other pressure part may be subjected to in service. For chlorine service, see paragraph (b)(7) of this section.

(2) Pipe joints must be threaded, welded or flanged. If threaded pipe is used, the pipe and fittings must be Schedule 80 weight or heavier. Malleable metals must be used in the construction of valves and fittings. Where copper tubing is permitted, joints shall be brazed or be of equally strong metal union type. The melting point of the brazing material may not be lower than 1000 °F. The method of joining tubing must not reduce the strength of

the tubing, such as by the cutting of threads.

(3) Each hose coupling must be designed for a pressure of at least 120 percent of the hose design pressure and so that there will be no leakage when connected.

(4) Piping must be protected from damage due to thermal expansion and contraction, jarring, and vibration. Slip joints are not authorized for this purpose.

(5) *Piping and fittings* must be grouped in the smallest practicable space and protected from damage as required by § 178.337-10.

(6) Cargo tank manufacturers and fabricators must demonstrate that all piping, valves, and fittings on a cargo tank are free from leaks. To meet this requirement, the piping, valves, and fittings must be tested after installation at not less than 80 percent of the design pressure marked on the cargo tank.

(7) A hose assembler must:

(i) Permanently mark each hose assembly with a unique identification number.

(ii) Demonstrate that each hose assembly is free from leaks by performing the tests and inspections in § 180.416(f) of this subchapter.

(iii) Mark each hose assembly with the month and year of its original pressure test.

(8) *Chlorine cargo tanks.* Angle valves on cargo tanks intended for chlorine service must conform to Drawing 104-8, dated July 1993, in the standards of The Chlorine Institute. Before installation, each angle valve must be tested for leakage at not less than 225 psig using dry air or inert gas.

(c) *Marking inlets and outlets.* Except for gauging devices, thermometer wells, and pressure relief valves, each cargo tank inlet and outlet must be marked "liquid" or "vapor" to designate whether it communicates with liquid or vapor when the cargo tank is filled to the maximum permitted filling density. A filling line that communicates with vapor may be marked "spray-fill" instead of "vapor."

(d) *Refrigeration and heating coils.* (1) Refrigeration and heating coils must be securely anchored with provisions for thermal expansion. The coils must

be pressure tested externally to at least the cargo tank test pressure, and internally to either the tank test pressure or twice the working pressure of the heating/refrigeration system, whichever is higher. A cargo tank may not be placed in service if any leakage occurs or other evidence of damage is found. The refrigerant or heating medium to be circulated through the coils must not be capable of causing any adverse chemical reaction with the cargo tank lading in the event of leakage. The unit furnishing refrigeration may be mounted on the motor vehicle.

(2) Where any liquid susceptible to freezing, or the vapor of any such liquid, is used for heating or refrigeration, the heating or refrigeration system shall be arranged to permit complete drainage.

[Order 59-B, 30 FR 580, Jan. 16, 1965. Redesignated at 32 FR 5606, Apr. 5, 1967]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting §178.337-9, see the List of CFR Sections Affected which appears in the Finding Aids section of the printed volume and on GPO Access.

178.337-10 Protection of fittings.

(a) All valves, fittings, safety relief devices, and other accessories to the tank proper shall be protected in accordance with paragraph (b) of this section against such damage as could be caused by collision with other vehicles or objects, jackknifing and overturning. In addition, safety relief valves shall be so protected that in the event of overturn of the vehicle on to a hard surface, their opening will not be prevented and their discharge will not be restricted.

(b) The protective devices or housing must be designed to withstand static loading in any direction equal to twice the weight of the tank and attachments when filled with the lading, using a safety factor of not less than four, based on the ultimate strength of the material to be used, without damage to the fittings protected, and must be made of metal at least $\frac{3}{16}$ -inch thick.

(c) *For chlorine tanks.* There shall be a protective housing and manway cover to permit the use of standard emergency kits for controlling leaks in fittings on the dome cover plate. The

housing and manway cover must conform to the Chlorine Institute's standards as follows:

(1) Tanks manufactured on or before December 31, 1974: Dwg. 137-1, dated November 7, 1962, or Dwg. 137-2, dated September 1, 1971.

(2) Tanks manufactured on or after January 1, 1975: Dwg. 137-2, dated September 1, 1971.

(d) Each cargo tank shall be provided with at least one rear bumper designed to protect the tank and piping in the event of a rear end collision and minimize the possibility of any part of the colliding vehicle striking the tank. The design shall be such as to transmit the force of a rear end collision in a horizontal line to the chassis of the vehicle. The bumper shall be designed to withstand the impact of the fully loaded vehicle with a deceleration of 2 "g", using a safety factor of four based on the ultimate strength of the bumper material. The bumpers shall conform dimensionally to §393.86, chapter III of this title.

[Order 59-B, 30 FR 581, Jan. 16, 1965. Redesignated at 32 FR 5606, Apr. 5, 1967]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting §178.337-10, see the List of CFR Sections Affected which appears in the Finding Aids section of the printed volume and on GPO Access.

§ 178.337-11 Emergency discharge control.

(a) *Emergency discharge control equipment.* Emergency discharge control equipment must be installed in a liquid discharge line as specified by product and service in §173.315(n) of this subchapter. The performance and certification requirements for emergency discharge control equipment are specified in §173.315(n) of this subchapter and are not a part of the cargo tank motor vehicle certification made under this specification.

(b) *Engine fuel lines.* On a truck-mounted cargo tank, emergency discharge control equipment is not required on an engine fuel line of not more than $\frac{3}{4}$ NPT equipped with a valve having an integral excess flow valve or excess flow feature.

[64 FR 28050, May 24, 1999]